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NOVITATES AGROSTOLOGICAE, IV. ADDITIONAL SEGREGATES FROM *PANICUM INCERTAE SEDIS*

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ABSTRACT

In order to contribute to an updated classification of the species hitherto included in *Panicum incertae sedis*, the new genera ***Aakia*** J.R. Grande, **gen. nov.** (syn = *Panicum* sect. *Tuerckheimiana*), ***Aconisia*** J.R. Grande, **gen. nov.** (syn = *P.* [infragen. unranked] *Grandia*), and ***Osvaldoa*** J.R. Grande, **gen. nov.** (syn = *Panicum* sect. *Valida*) are described and ten new combinations in *Dallwatsonia* and *Coleataenia* are proposed. *Panicum hemitomon* is confirmed in *Hymenachne*, and consequently *Panicum* sect. *Hemitoma* is reduced to synonymy under that genus. Altogether, three new genera and 14 new combinations at the rank of species are proposed, while six infrageneric entities previously included in *Panicum* incertae sedis are formally synonymized. A lectotype is designated for *Panicum validum* Mez.

Recent systematic works dealing with the tribe Paniceae s.l. (tribe Paniceae plus tribe Paspaleae *sensu* Morrone et al. 2011) have been using the provisional taxon *Panicum* L. *incertae sedis* (i.s.) to group 158 species originally described under *Panicum* but excluded from that genus based on cladistic evidence (Aliscioni et al. 2003). Thenceforth, several new genera have been established, grouping species with more or less similar morphology, anatomy, and physiological type and with a hypothetical common ancestor including all its descendants. These studies, based on cladistic analyses using the molecular markers *ndhF*, *rpoA* and *rpoC2* and/or morphoanatomical data have been looking for a consensus between cladistic insights and previous classifications (see Morrone et al. [2011] and the subsequent Zuloaga et al. [2011] and Scataglini & Zuloaga [2013], for a review of this line of active research). Despite this, several well-defined species groups have been left behind in *Panicum* L. i.s., a clearly polyphyletic group (Gómez-Martínez 1998; Gómez-Martínez & Culham 2000; Zuloaga et al. 2000; Aliscioni et al. 2003; Morrone et al. 2011, etc.).

As a result of the comparative analysis of the general exomorphology, upper anthecium micromorphology, foliar anatomy, and geographical distribution pattern, and with the aim to further contribute to solve the present taxonomic confusion, the following new taxa previously included in *Panicum* i.s. are here described. Altogether, three new genera, 14 new combinations at the rank of species, and six new infrageneric synonyms previously included in *Panicum* i.s. are here proposed. The taxonomical novelties follow a strict alphabetical order and include only the basionyms and all its homotypic synonyms.

1. *AAKIA* J.R. Grande, **gen. nov.** *Panicum* [infragen. unranked] *Tuerckheimiana* Hitchc., N. Amer. Fl. 17(3): 201, 210. 1915. *Panicum* sect. *Tuerckheimiana* (Hitchc.) Zuloaga, Grass Syst. Evol. [Soderstrom et al.] 296. 1988 [1987]. **TYPE**: *Panicum tuerckheimii* Hack.

Perennials with erect culms. Panicles more or less contracted. Spikelets lanceolate, acuminate, sparsely pilose to glabrous. Lower glume small, scalelike, nerveless. Upper glume and lower lemma pointed, 5-nerved. Lower palea reduced or absent, lower flower absent. Upper anthecium cartilaginous, papillate, pilose toward the apex.

Etymology and distribution

Aakia is a latinization of *aak*, a word commonly employed by the Maya people to refer to grasses (Bastarrachea Manzano 2011). Southern Mexico, Guatemala and Belize.

1a. Aakia tuerckheimii (Hack.) J.R. Grande, **comb. nov**. *Panicum tuerckheimii* Hack., Allg. Bot. Z. Syst. 12: 60. 1906. **TYPE: GUATEMALA.** Alta Verapaz: Cubilgüitz im Hochwald, 350 m, 1903, *H. von Tuerckheim II 820* (holotype: W; isotypes: GH!, NY-232347! (fragm.), US-81303! (fragm. ex W), US-973891!, US-973890!).

Aakia belongs to subtribe Paspalinae, part of tribe Paspaleae, while *Panicum* is the type genus of true Paniceae. Endemic to Mesoamerica but phylogenetically near to the South American endemic *Anthaenantiopsis* Mez ex Pilg. (Aliscioni et al. 2003), although they apparently do not share any diagnostic morphological character. For further discussion, see under *Osvaldoa*.

2. ***ACONISIA*** J.R. Grande, **gen. nov**. *Panicum* [infragen. unranked] *Grandia* Hitchc., N. Amer. Fl. 17(3): 201, 209. 1915. **TYPE**: *Panicum grande* Hitchc. & Chase.

Robust and perennial gregarious grasses, producing extensively creeping or floating leafy stolons. Leaves with conspicuous lacunae in the mesophyll and superposed vascular bundles in vertical rows toward the center of the blade. Panicles with the lower primary branches whorled. Spikelets tightly disposed toward the end of terminal branches, supported by adpressed pedicels 1-2 mm long. Upper anthecium indurate with bicellular microhairs toward the apex.

Etymology and distribution

The generic name is derived from classical greek *akone*, a grindstone, which derivate verb *akonizo* produces, in passive preterite participle *akonismenos*, sharp-edged. *Aconisia* is proposed as an abbreviated and easily pronounceable form, alluding equally to the cutting borders of the leaf blades. Brazil, Panama, Trinidad & Tobago, and Venezuela.

2a. Aconisia grande (Hitchc. & Chase) J.R. Grande, **comb. nov**. *Panicum grande* Hitchc. & Chase Contr. U.S. Natl. Herb. 17: 529, f. 143. 1915. **TYPE: PANAMA.** Canal Zone: collected in the water of a swamp along the margin of Gatun Lake, 15 XII 1911, *A.S. Hitchcock 9178* (holotype: US-693329!, US-693330!, US-693331!; isotypes: F!, G!, ISC, K!, LIL!, MO-848738!, NY!, P!, SI!, W).

Aconisia is loosely similar to *Coleataenia*, with which it shares scarce prickle hairs and more or less abundant bicellular microhairs toward the apex of the upper lemma. It can be distinguished from that genus, however, by the closed sheaths (vs. widely open), wide leaf blades, panicle structure (see above), straight (vs. oblique) insertion of the spikelet into the pedicel, elliptic upper anthecium (vs. narrowly fusiform), and the anatomical characteristics cited above.

3. ***COLEATAENIA*** Griseb., Abh. Königl. Ges. Wiss. Göttingen 24: 308. 1879.

Panicum sect. *Prionitia* Zuloaga, Grass Syst. Evol. [Soderstrom et al.] 294. 1988 [1987]. **TYPE**: *Panicum prionitis* Nees

Sorengia Zuloaga & Morrone, Taxon 59(5): 1541, 2010. **TYPE**: *Panicum agrostoides* Hitchc. & Chase, nom. illeg. superfl.

Etymology and distribution

Presumably derived from Classical Greek *colea* (sheath) and *taenia* (flat band), in allusion to the widely open leaf sheaths, which resemble a band or strip (B. Manara, pers. comm.). Tropical, subtropical and temperate America (commonly reported as "New World" in taxonomic literature).

3a. Coleataenia beyeri (Hitchc. & Ekman) J.R. Grande, **comb. nov**. *Panicum beyeri* Hitchc. & Ekman, Man. Grasses W. Ind. 165, f. 225. 1936. **TYPE: CUBA**. Oriente: E.L. Ekman 15045, 8 IX 1922 (holotype: US-1387466!; isotypus: US-1720519!).

Panicum beyeri Hitchc. & Ekman shows the characteristic leaf type of *Coleatania*, including widely opened sheaths grading into the filiform blades, these with a conspicuous central nerve, panicles with adpressed pedicels and spikelets obliquely inserted on them, often with the first glume gaping at maturity, and with a narrowly fusiform upper anthecium. This species is very similar to *Coleataenia prionitis* (Nees) Soreng and *C. petersonii* (Hitchc. & Ekman) Soreng, which form a well-defined monophyletic unit within the genus (Hitchcock 1936; Morrone et al. 2011). *Panicum beyeri* was included neither in *Panicum* i.s. by Aliscioni et al. (2003) nor in *Coleataenia* by Soreng (2010) or Weakley et al. (2011).

4. *DALLWATSONIA* B.K. Simon, Austrobaileya 3: 678. 1992.

Etymology and distribution

Named for Michael Dallwitz, formerly of CSIRO Division of Entomology, and Leslie Watson, formerly of RSBS, Australian National University (Simon, 2013). Nine species in tropical America (commonly referred as "Neotropics" in taxonomic literature), plus two additional species in southeastern Asia (*Dallwatsonia aurita* (J. Presl ex Nees) J.R. Grande) and Australia (*D. felliana* B.K. Simon).

4a. Dallwatsonia aurita (J. Presl ex Nees) J.R. Grande, **comb. nov**. *Panicum auritum* J. Presl ex Nees, Fl. Bras. Enum. Pl. 2(1): 176-177, 1829. *Hymenachne aurita* (J. Presl ex Nees) Balansa, J. Bot. (Morot) 4: 144. 1890. **Lectotype** (designated by Veldkamp, Blumea 41: 187. 1996): **PHILIPPINE ISLANDS**. Luzon, *Haenke s.n.* (PR; isolectotypes: LE, MO-1837624!, MO-1837639!, W).

4b. Dallwatsonia bresolinii (L.B. Sm. & Wassh.) J.R. Grande, **comb. nov**. *Panicum bresolinii* L.B. Sm. & Wassh., Bradea 2: 245, f. 2 A–D. 1978. **TYPE: BRAZIL**. Santa Catarina: Floriannópolis, Morro Costa da Lagaô, beira do regato, mata, 200 m, 19 IV 1967, *Klein & Bresolin 7360* (holotype: US-2536896!; isotypes: FLOR, HBR).

4c. Dallwatsonia condensata (Bertol.) J.R. Grande, **comb. nov**. *Panicum condensatum* Bertol., Opusc. Sci. 3: 408. 1819. *Hymenachne condensata* (Bertol.) Chase, J. Wash. Acad. Sci. 13: 177. 1923. **TYPE: [BRAZIL]**. Habitat in provincia di Rio de Janeiro Brasiliae, *Raddi s.n.* (holotype: BOLO; isotypes: K!, FI (3 sheets), PI, US-80598! (fragm. ex FI, PI & photo).

4d. Dallwatsonia hylaeica (Mez) J.R. Grande, **comb. nov**. *Panicum hylaeicum* Mez, Notizbl. Bot. Gart. Berlin-Dahlem 7: 75. 1917. **TYPE: [BRAZIL]**. In vicinibus Santarem, Prov. Pará, VIII 1850 ["Brasilia sept., Dept. Para prope Santarem R. Spruce (Panic. n. 26)", as cited in the protologue], *R. Spruce Panicum 26* (holotype: M; isotypes: K-000309214!, P, US-80752!, (fragm. ex M & photo)).

4e. Dallwatsonia leptachne (Döll) J.R. Grande, **comb. nov**. *Panicum leptachne* Döll, Fl. Bras. 2(2): 195. 1877. **TYPE: [BRAZIL]**. Loco accuratis non indicato, *Widgren 1157* (holotype: S; isotypes: US-80737! (fragm. ex S)).

4f. Dallwatsonia longa (Hitchc. & Chase) J.R. Grande, **comb. nov**. *Panicum longum* Hitchc. & Chase, Contr. U.S. Natl. Herb. 15: 111, f. 106. 1910. **TYPE: MEXICO**. Veracruz: near Jalapa, gravelly banks, 4000 ft, 21 May 1899, *C.G. Pringle 8195* (holotype: US-354552!; isotypes: BM!, MO!, CM, M, NY!, P!, US-742435!, W). Homotypic with *Panicum pilosum* var. *macranthum* Scribn., Circ. Div. Agrostol. U.S.D.A. 19: 1. 1900. Hitchcock and Chase noted that *Panicum longum* was a "nom. nov." for *Panicum munitum* Trin. ex Steud. (1841), but since they provided a new name and new type, *P. longum* was essentially a sp. nov.

4g. Dallwatsonia pilosa (Sw.) J.R. Grande, **comb. nov**. *Panicum pilosum* Sw., Prodr. 22. 1788. **TYPE: JAMAICA**. *O.P. Swartz s.n.* (holotype: S; isotype: US-80916! (fragm. ex S)).

4h. Dallwatsonia polygonata (Schrad.) J.R. Grande, comb. nov. *Panicum polygonatum* Schrad., Mant. 2: 256. 1824. **TYPE: BRAZIL**. [Bahia]: Ad ripas fluvia Ilhéos, 1816, *Princeps Sereniss. Maximillian Neowidens s.n.* (holotype: LE; isotypes: B, BAA-1935! (fragm. ex B), US-80925! (fragm. ex LE)).

4i. Dallwatsonia stagnatilis (Hitchc. & Chase) J.R. Grande, **comb. nov**. *Panicum stagnatile* Hitchc. & Chase, Contr. U.S. Natl. Herb. 17: 528, f. 141. 1915. **TYPE: PANAMA**. Canal Zone: in water of swamp, Frijoles, 12 Oct 1911, *A.S. Hitchcock 8388* (holotype: US-693328!; isotypes: BAA! (fragm.), BM-000938691!, F!, G!, K!, LIL!, MO-853765!, MO-853766!, NY!, P!, US!, W).

4j. Dallwatsonia stevensiana (Hitchc. & Chase) J.R. Grande, **comb. nov**. *Panicum stevensianum* Hitchc. & Chase, Contr. U.S. Natl. Herb. 17: 498, f. 76. 1915. **TYPE: PUERTO RICO**. On wet sand around pool, white sand region, Campo Alegre, near Laguna del Tortugero, 25 XI 1913, *A. Chase 6616* (holotype: US-693323!; isotypes: NY-71075!, NY-71076!, US!).

Dallwatsonia was originally described as monotypic, with a single species from Australia (*D. felliana* B.K. Simon). It is here expanded, however, to include the American species left as *incertae sedis* in *Panicum* sect. *Laxa* by Aliscioni et al. (2003), plus *Panicum auritum* Presl ex Nees, a species from southeastern Asia formerly included in that section by Zuloaga et al. (1992). Phenotypic characters that may be considered diagnostic include hollow culms, secund spikelets disposed in two pararell rows along the branches of the panicle, and upper anthecium pointed, membranous to more or less indurate, with conspicuous, basally thickened prickles toward the apex, and with the apex of the palea covered by the lemma (Watson & Dallwitz 1992 onwards; Simon 2013; Zuloaga 1987; Zuloaga et al. 1992; Morrone et al. 2011). As noted in previous works (Amaya Worm 2001; Morrone et al. 2011), fusoid cells are somewhat variable in their pattern of distribution and are also present in other genera of subtribe Otachyrinae, like *Hymenachne* (e.g., *H. grumosa* (Nees) Zuloaga) and *Steinchisma* (e.g., *S. laxa* (Sw.) Zuloaga).

Although *Dallwatsonia aurita* has been considered a member of the closely related *Hymenachne*, its hollow culms are characteristic of *Dallwatsonia* (vs. filled with aerenchyma in *Hymenachne*; see Pohl & Lersten 1975). Monophyly (as well as an ambiguous holophyly) of the genus is supported by recent cladistic analyses (Morrone et al., 2011).

5. *HYMENACHNE* P. Beauv., Ess. Agrostogr., 48. 1812.

Panicum [infragen. unranked] *Hemitoma* Hitchc., N. Amer. Fl. 17(3): 200, 210. 1915. *Panicum* sect. *Hemitoma* Hitchc. & Chase ex Freckmann & Lelong, Sida 20: 163 (2002). **TYPE**: *Panicum hemitomon* Schult.

Panicum sect. *Hemitoma* is here synonymized because of the clear assignment of *P. hemitomon* to *Hymenachne*. That species, however, was included as *Panicum* i.s. by Aliscioni et al.

(2003). The diagnostic characters were noted first by Hsu (1965), who made the appropriate combination.

Etymology and distribution

From Classical Greek *hymen-* (a membrane) and *-achne* (palea; Palisot de Beauvois 1812). Tropical America, Southeastern Asia, Australia and the Pacific Islands.

Although the first species designated as the type (i.e., lectotype) of *Hymenachne* was *Hymenachne myuros* (Lam.) P. Beauv. (Pfeiffer 1873), the basionym of that name (*Panicum myuros* Lam., cited as "*Agrostis myuros* Lam." in the protologue) corresponds to *Sacciolepis myuros* (Lam.) Chase, a species not intentionally cited by Beauvois in his work, as has been shown by Niles (1925) and Panigrahi & Dubey (1986), who designated *H. monostachya* (Poir.) P. Beauv. (actually *H. amplexicaulis* (Rudge) Nees), another species' name available in the protologue, as the type of the genus.

6. *Osvaldoa* J.R. Grande, **gen. nov**. *Panicum* sect. *Valida* Zuloaga & Morrone, Syst. Bot. 14: 228. 1989. **Type**: *Panicum validum* Mez.

Caespitose, short-rhizomatous perennials. Similar to *Aakia* but differing in the linear-lanceolate leaf baldes and the first glume 3/4 the length of the spikelet.

Etymology and distribution

This genus is dedicated to Osvaldo Morrone (1957-2011), a renowned Argentinian agrostologist whose studies in the Paniceae s.l. have helped to clarify many generic boundaries. Argentina, Brazil, and Uruguay.

6a. Osvaldoa valida (Mez) J.R. Grande, **comb. nov**. *Panicum validum* Mez, Bot. Jahrb. Syst. 56 (Beibl. 125): 4. 1921. **Lectotype** (designated here): **ARGENTINA**. Entre Ríos: Concepción del Uruguay, arrollo de La China, XI 1876, *P.G. Lorentz 840* (CORD-00001751!; isolectotypes: B, BAA-00000403! (fragm. ex B) BAA-00000404! (fragm. ex B), CORD-00001750!, GOET-006793!, US-98989! [fragm. ex B]).

Based on the morphological particularities of this species, Zuloaga et al. (1989) created *Panicum* sect. *Valida* Zuloaga & Morrone. More recently, however, Aliscioni et al. (2003) have shown that both *Panicum validum* and *P. tuerckheimii* are closely related to the genus *Anthaenantiopsis*, an endemic of southern Brazil, Paraguay, and Argentina. There is not any reliable morphological synapomorphy shared by these three genera.

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